



Centre Technique Industriel
de la Plasturgie et des Composites

Challenges and opportunities of the recycling of bio-based plastic packaging in the PPWR (Packaging & Packaging Waste Regulation)

INN-PRESSME policy and dissemination event

Friday 26 January 2024 | 10:00-12:15 CET



“ **IPC, the French Technical Center for Innovation and Expertise at the service of the Plastics and Composites industry** ”



IPC, created on December 1, 2015, depends on the Ministry of the Economy (Directorate General for Enterprises)

Text of reference used in the presentation

European Parliament

2019-2024



TEXTS ADOPTED

P9_TA(2023)0425

Packaging and packaging waste

Amendments* adopted by the European Parliament on 22 November 2023 on the proposal for a regulation of the European Parliament and of the Council on packaging and packaging waste, amending Regulation (EU) 2019/1020 and Directive (EU) 2019/904, and repealing Directive 94/62/EC (COM(2022)0677 – C9-0400/2022 – 2022/0396(COD))¹

(Ordinary legislative procedure: first reading)

https://www.europarl.europa.eu/doceo/document/TA-9-2023-0425_EN.pdf

Bio-based plastic

bio-based

derived from biomass

bio-based plastic

plastic wholly or partly derived from biomass

bio-based polymer

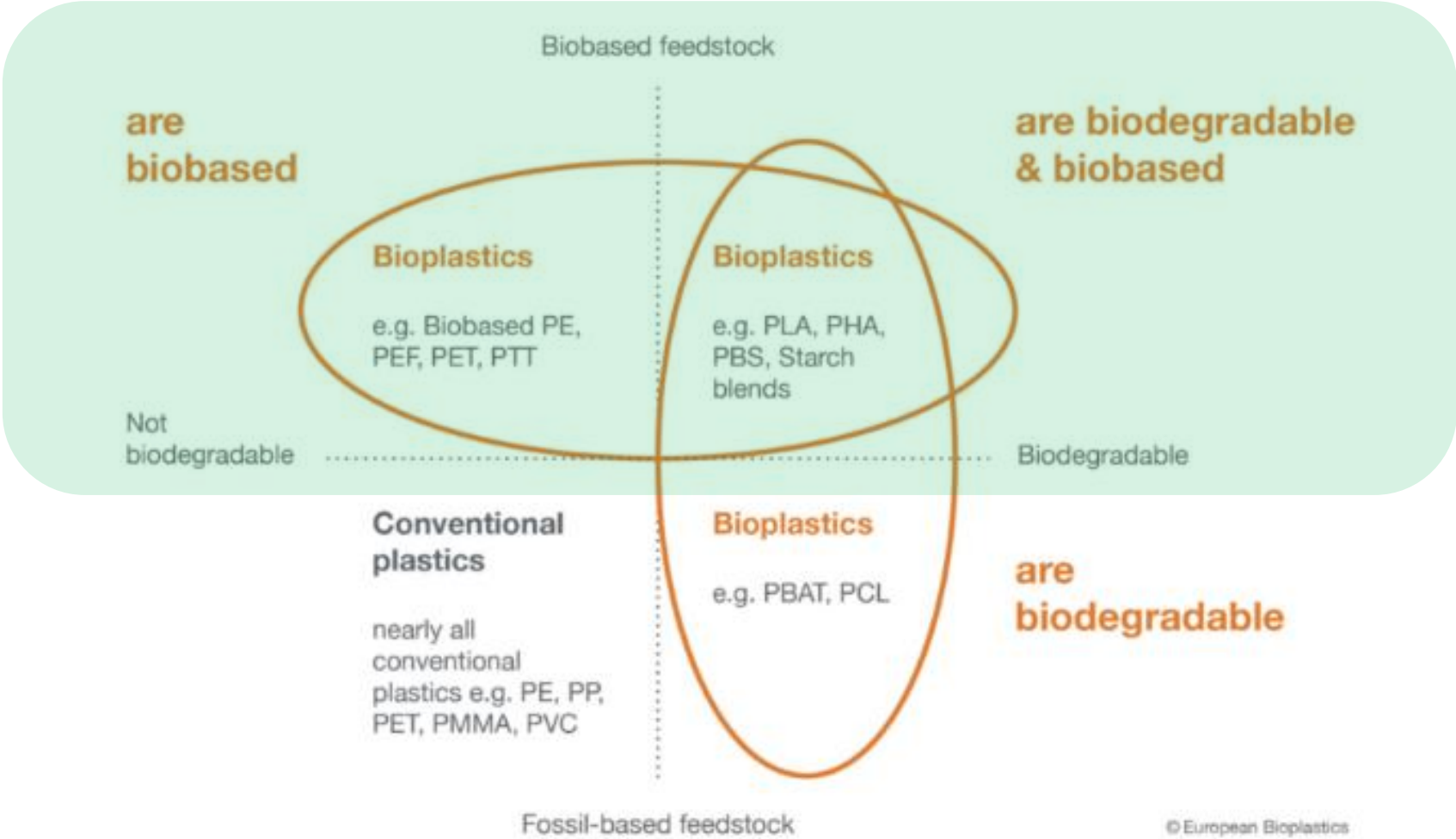
polymer wholly or partly derived from biomass

EUROPEAN STANDARD
NORME EUROPÉENNE
EUROPÄISCHE NORM

EN 17615

June 2022

Bio-based plastic



Bio-based plastics vs. Recycling

The PPWR – Article 6

All packaging *placed on the market* shall be recyclable

2. Packaging shall be considered recyclable where it complies with the following:
 - (a) it is designed for recycling;
 - (b) it is effectively and efficiently separately collected in accordance with Article 43(1) and (2);
 - (c) it is sorted into defined waste streams without affecting the recyclability of other waste streams;
 - (d) **it can be recycled** so that the resulting secondary raw materials are of sufficient quality to substitute the primary raw materials;
 - (e) it can be recycled at scale.

RECYCLABILITY

EUROPEAN STANDARD
NORME EUROPÉENNE
EUROPÄISCHE NORM

EN 17615

June 2022

recyclability

potential of items or materials to be recycled as defined by the relevant **standards** and **regulations** in force

What do the standards say ?

mechanical recycling

processing of plastic waste into secondary raw materials or products without significantly changing the chemical structure of the material

physical recycling

process in which a plastic is subjected to a series of purification steps to separate the target polymer/polymers from other polymers, additives and other added materials such as fibres, fillers, colorants and contaminants, resulting in recovered polymers, which remain largely unaffected by the process and can be reformulated into plastics

chemical recycling

conversion of polymers into chemical substances by changing the chemical structure of plastic waste through processes such as cracking, pyrolysis, gasification or depolymerization excluding energy recovery and the production of materials that are to be used as fuels or for backfilling operations

organic recycling

composting or anaerobic digestion of biodegradable organic waste under controlled conditions using microorganisms to produce, in the presence of oxygen, stabilized organic residues, carbon dioxide and water or, in the absence of oxygen, stabilized organic residues, methane, carbon dioxide and water

Article 47

Rules on the calculation of the attainment of the recycling targets

8. The amount of biodegradable packaging waste that enters aerobic or anaerobic treatment may be counted as recycled where that treatment generates compost, digestate, or other output with a similar quantity of recycled content in relation to input, which is to be used as a recycled product, material or substance. Where the output is used on land, Member States may count it as recycled only if this use results in benefits to agriculture or ecological improvement.

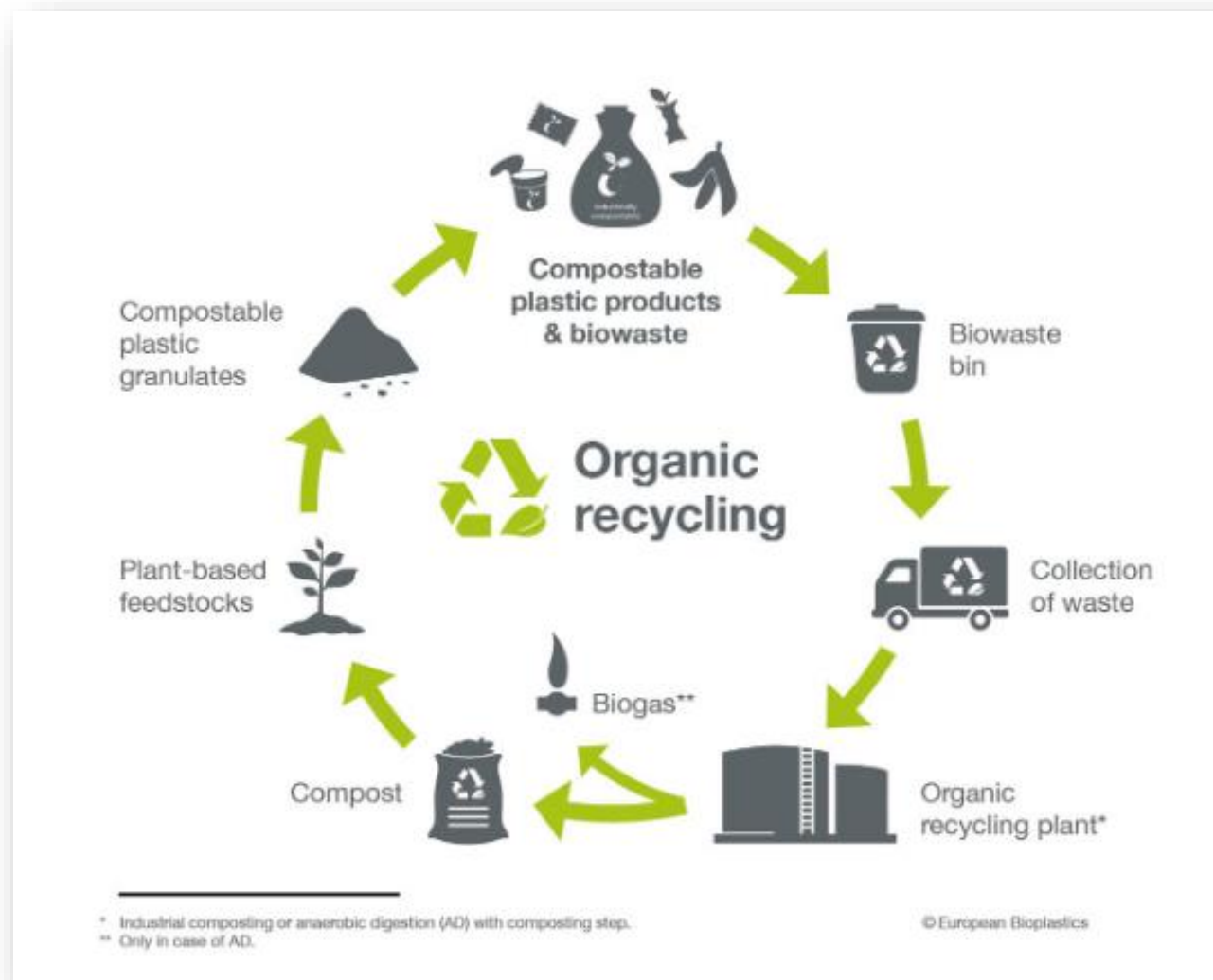
9. The amount of packaging waste materials that have ceased to be waste as a result of a *recovery* operation *by which waste* materials are *reprocessed* into products, materials or substances *either* for the original or other purposes *may be counted as recycled*. However, end-of-waste materials to be used as fuels or other means to generate energy, or to be incinerated, backfilled or landfilled, shall not be counted as recycled.

(c) it is of *such* biodegradable nature *that it allows* the packaging to undergo physical, chemical, thermal or biological decomposition, including anaerobic digestion, resulting ultimately in conversion into carbon dioxide *and water, new microbial biomass, mineral salts, and, in the absence of oxygen, methane,*

INDUSTRIAL COMPOSTING ANAEROBIC DIGESTION

=

RECYCLING



MECHANICAL AND CHEMICAL RECYCLING ALSO WORKS !



Futero aims to set-up a new fully integrated PLA biorefinery in Normandy, France.



08-Dec-2022

PRESS RELEASE

Brussels, 8 December 2022

Futero plans to set up Europe's first vertically integrated biorefinery in Normandy to produce PLA and recycle it

BIO-BASED PLASTICS IN THE WASTE STREAMS

Collection of household plastic packaging waste



Sorting centre

Bio-based PP, PE, PET



?

PLA, PHA, PBS, starch blends

Bottles



- Clear PET
- Coloured PET
- Opaque PET
- PP and HDPE

Films

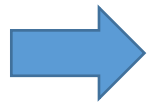


- PE
- PP
- Others (multilayers ...)

Pots and trays



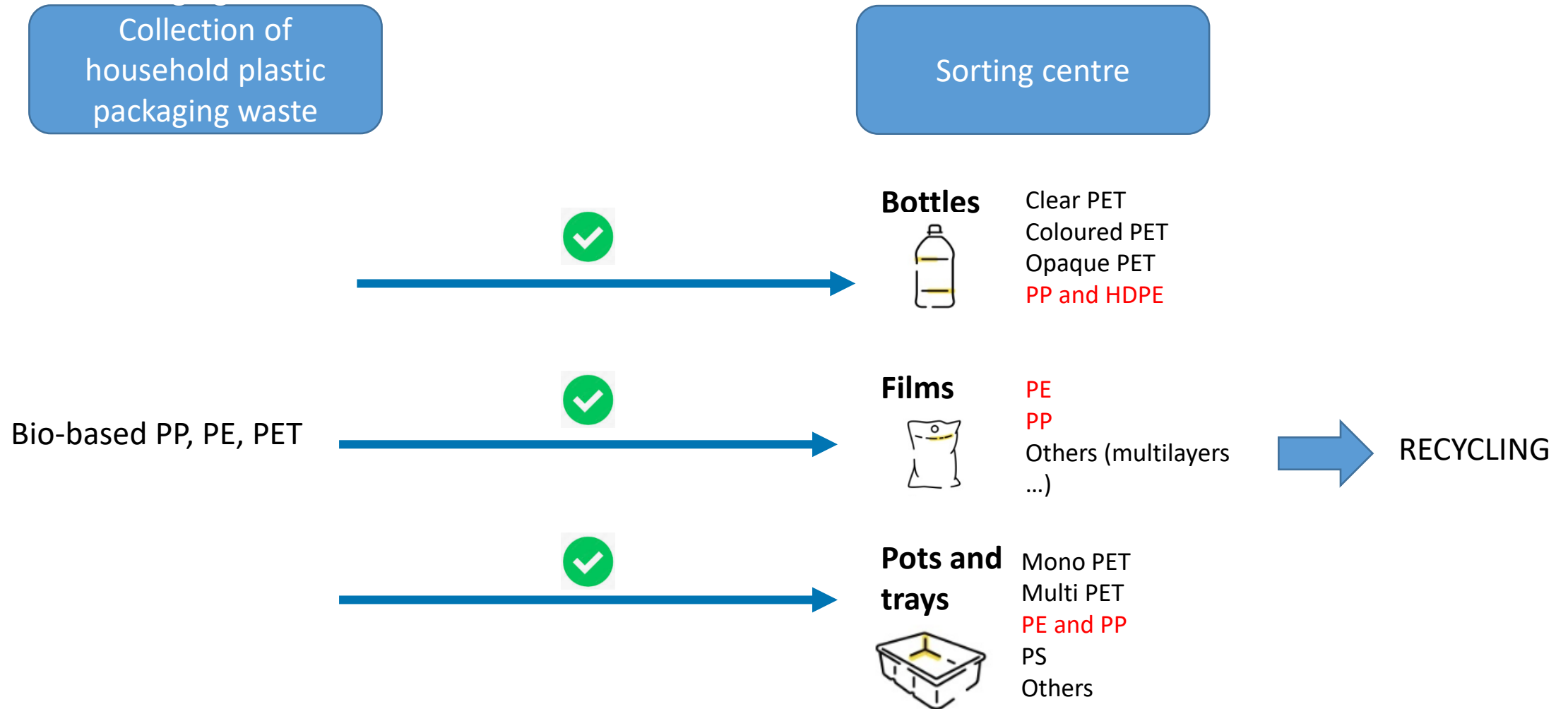
- Mono PET
- Multi PET
- PE and PP
- PS
- Others



RECYCLING

Any risk of affecting the recyclability of other waste streams ?

BIO-BASED PLASTICS IN THE WASTE STREAMS



BIO-BASED PLASTICS IN THE WASTE STREAMS

Collection of household plastic packaging waste

PLA, PHA, PBS,
starch blends



Contaminants (incineration, landfilling ...)
No sorting = No recycling



??

Sorting centre

Bottles



Clear PET
Coloured PET
Opaque PET
PP and HDPE

Films



PE
PP
Others (multilayers
...)

Pots and trays

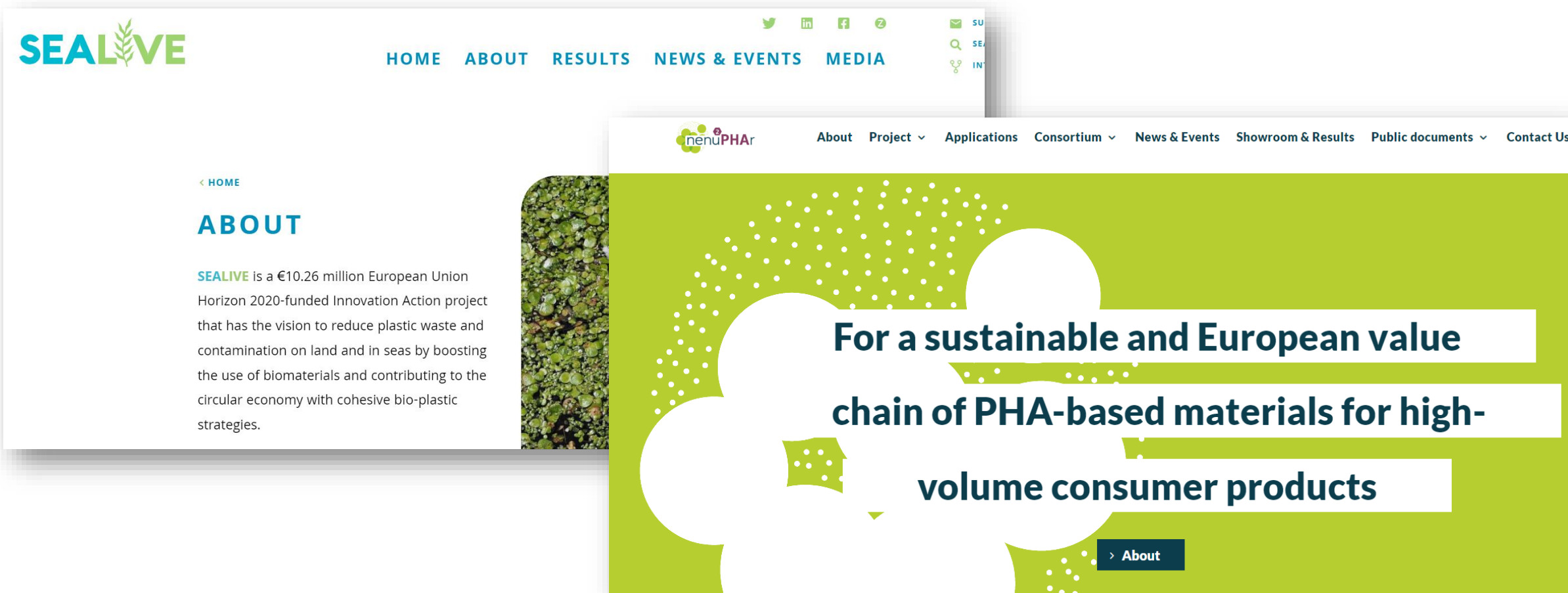


Mono PET
Multi PET
PE and PP
PS
Others



RECYCLING

SORTING OF BIODEGRADABLE BIO-BASED PLASTICS = TECHNICALLY PROVEN



The economic profitability has not been proven yet (the market remains too small)

The bottlenecks are economic: more sorting machines = €€€

NO RECYCLING AT SCALE

BIO-BASED PLASTIC PACKAGING vs. RECYCLING

Non-biodegradable (bio-PE, -PP, -PET)

Compatible with existing sorting/recycling infrastructures for petro-based PE, PP, PET



Mechanical recycling



Physical recycling



Chemical recycling



Biodegradable (PLA, PHA, PBS, starch blends ...)

Lack of compatibility with existing sorting/recycling infrastructures



Organic recycling



Mechanical recycling



Chemical recycling



Bio-based plastics vs. Composting

OPPORTUNITY FOR LIMITED APPLICATIONS

Article 8

Compostable packaging

By [OP: please insert the date = 24 months from the entry into force of this Regulation], packaging referred to in Article 3(1), points (f) and (g), sticky labels attached to fruit and vegetables and very lightweight plastic carrier bags shall be compostable in industrially controlled conditions in bio-waste treatment facilities.

Shall be compostable in industrially controlled conditions in bio-waste treatment facilities :

- Sticky labels attached to fruit and vegetables
- Very lightweight carrier bags (thickness < 15 µm)
- Tea or coffee bags / coffee or tea system single-serve units

Risks:

- Appropriate collection systems (e.g. together with bio-waste collection)
- Availability of bio-waste treatment facilities
- Compostability in industrially controlled conditions must be proven / certified

ANNEX III

COMPOSTABLE PACKAGING

Conditions to be considered when mandating the use of compostable packaging format:

- (a) it could not have been designed as reusable packaging or the products could not be placed on the market without packaging;
- (b) it is **designed to enter the organic waste stream at the end of its life**;
- (c) it is of **such** biodegradable nature **that it allows** the packaging to undergo physical, chemical, thermal or biological decomposition, including anaerobic digestion, resulting ultimately in conversion into carbon dioxide **and water, new microbial biomass, mineral salts, and**, in the absence of oxygen, **methane**.
- (d) its use significantly **increases the collection of organic waste** compared to the use of non-compostable packaging materials;
- (e) its use significantly reduces the contamination of compost with non compostable packaging and **does not cause any problems in bio-waste processing**
- (f) its use **does not increase the contamination of non-compostable packaging waste streams**.

Recycled content targets and bio-based plastics

MINIMUM RECYCLED CONTENT TARGETS IN PLASTIC PACKAGING

Article 7

Minimum recycled content in plastic packaging

From 1 January 2030, the plastic part in packaging *placed on the market* shall, *unless this results in non-compliance with food safety requirements laid down at Union level*, contain the following minimum percentage of recycled content recovered from post-consumer plastic waste:

(a) 30 % for contact sensitive packaging, **except single use beverage bottles**, made from polyethylene terephthalate (PET) as the major component;

(b) 7,5 % for contact sensitive packaging made from plastic materials other than PET, except single use plastic beverage bottles;

(c) 30 % for single use plastic beverage bottles;

(d) 35 % for **plastic** packaging other than those referred to in points (a), (b) and (c).

BIO-BASED PLASTIC AS A FEEDSTOCK TO MEET RECYCLED CONTENT TARGETS

By **31 December 2025**, the Commission shall publish a report assessing the possibility of laying down targets for the **use of bio-based plastic feedstock in packaging in order to meet the targets set out in of Article 7(1) and (2)**. Where appropriate and based on the report referred to in paragraph 1, the Commission shall present a legislative proposal in order to:

- (a) lay down targets for the use of biobased plastic feedstock in packaging;
- (b) lay down sustainability requirements for **bio-based plastic feedstock to become eligible to contribute to the targets**, considering the existing sustainable criteria laid down in Article 29 of Directive (EU) 2018/2001;
- (c) introduce the **possibility to meet up to a maximum of 50% of the targets set out in Article 7(1) and (2)** by using biobased plastic feedstock.

CONCLUSION

- ❑ Economic incentives are necessary to boost the bio-based packaging market so that profitability for additional investment costs in sorting and recycling centres can be reached
- ❑ The sorting of bio-based plastics in sorting centres is technically proven
- ❑ Mechanical and chemical recycling of bio-based plastics (incl. biodegradable ones) is possible, similarly to fossil-based plastics
- ❑ Advantage to be taken for bio-based plastics to contribute to the recycled content targets

LE CENTRE DE LA PLASTURGIE TECHNIQUE ET DES COMPOSITES INDUSTRIEL

NOUS CONTACTER

IPC OYONNAX

2 rue Pierre & Marie Curie
01100 BELLIGNAT

IPC LAVAL

Parc universitaire et technologique
Rue Léonard de Vinci
53810 CHANGÉ

IPC ALENCON

Pôle universitaire de Montfoulon
61250 DAMIGNY

IPC CLERMONT

Biopôle Clermont-Limagne
Rue Michel Renaud
63360 SAINT-BAUZIRE



+33 (0)4 74 81 92 60

[linkedin.com/company/ct-ipc](https://www.linkedin.com/company/ct-ipc)

https://twitter.com/ct_ipc



Gulfstream



Vous pouvez bénéficier d'un bonus Crédit Impôt Recherche pour votre étude d'innovation grâce à notre statut de CTI.